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### The Development of a Core Forensic Standards Framework for Australia

James Robertson<sup>a</sup>, Karl Kent<sup>b</sup> & Linzi Wilson-Wilde<sup>c</sup>

<sup>a</sup> Director, National Centre for Forensic Studies (NCFS); Faculty of Education, Science, Technology and Mathematics (ESTeM), University of Canberra, Canberra, Australia

<sup>b</sup> Chair, Senior Managers of Australia New Zealand Forensic Laboratories (SMANZFL); Director, Victoria Police Forensic Services Department (VPFSD), Macleod, Victoria, Australia

<sup>c</sup> General Manager, National Institute of Forensic Science (NIFS), Australia, and New Zealand Policing Advisory Agency (ANZPAA), Docklands, Victoria, Australia

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# The Development of a Core Forensic Standards Framework for Australia

James Robertson,<sup>1</sup>  
Karl Kent,<sup>2</sup> and  
Linzi Wilson-Wilde<sup>3</sup>

<sup>1</sup>Director, National Centre for Forensic Studies (NCFS); Faculty of Education, Science, Technology and Mathematics (ESTeM), University of Canberra, Canberra, Australia

<sup>2</sup>Chair, Senior Managers of Australia New Zealand Forensic Laboratories (SMANZFL); Director, Victoria Police Forensic Services Department (VPFSD), Macleod, Victoria, Australia

<sup>3</sup>General Manager, National Institute of Forensic Science (NIFS), Australia, and New Zealand Policing Advisory Agency (ANZPAA), Docklands, Victoria, Australia

**ABSTRACT** Forensic laboratories, and less so field forensic organizations, are familiar with the International Organization for Standardization (ISO) and other standards principally through third-party accreditation against ISO 17025. However, there are a limited number of forensic-specific standards. The often quoted 2009 National Research Council (NRC) and National Academies (NAS) report on strengthening forensic science identified the lack of formal standards as a major issue. Where such standards do exist, such as the American Society for Testing and Materials' (ASTM International) forensic standards, they are usually very specific to a particular technique. This paper describes the development of a different approach in Australia. Recognizing the end-to-end nature of the forensic enterprise from crime scene to the court, a standard has been developed that is intentionally not discipline-specific. In four parts, this standard (AS 5388) covers the recognition, recording, recovery, transport and storage of material (Part 1,) the analysis of material (Part 2), interpretation (Part 3), and reporting (Part 4). The management of the process that was used to develop this standard is described, and lessons for the future development of standards identified and discussed. Finally, how this standard can be used as a platform for the development of discipline standards and as an international standard is discussed.

**KEYWORDS** Standard development, accreditation, ISO, interpretation, reporting, forensic science

## INTRODUCTION

Depending on context, the word *standard* can mean many things to many people. The need to develop a shared understanding of what is meant by a standard resulted in the establishment, in 1947, of the International Organization for Standardization known as the ISO.

ISO Guide 2: 2004 defines a standard as “a document established by consensus and approved by a recognized body that provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context” (International Standards Organization 2013a). Or put simply, a standard is a set of rules for ensuring quality.

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Address correspondence to James Robertson, Director, NCFS, University of Canberra, Canberra, ACT, 2601 Australia. E-mail: james.robertson@canberra.edu.au

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Standards Australia (SA) defines standards as “. . . published documents setting out specifications and procedures designed to ensure products, services and systems are safe, reliable, and consistently perform the way they were intended to. They establish a common language which defines quality and safety criteria” (Standards Australia 2013). In the forensic context, a standard may be thought of as “a basis for judging quality, or a level of excellence aimed at, required, or achieved” (Kernerman 2013).

Since the very first ISO standard issued in 1951, there are now in excess of 19,500 ISO standards (ISO 2013a). ISO spells out the benefits of international standards (ISO 2013b) as including technological, economic, and societal benefits by harmonizing technical specifications, thereby making industry more efficient and breaking down barriers to international trade. Furthermore, conformity to international standards helps develop products that are safe, efficient, and beneficial for the environment.

In the context of the forensic sciences the most significant standard is ISO 17025 or General Requirements for the Competence of Testing and Calibration Laboratories (Brandi and Wilson-Wilde 2013). This standard applies to any organization performing tests and/or calibrations and is not specific for laboratories conducting forensic tests. Nor is this the only standard dealing with specific forensic testing. For example, ASTM International (until 2001 known as the American Society for Testing and Materials) has published around 40 standards or scientific methodologies used in forensic analysis (ASTM International 2013). These include method specific standards such as E1618–11 Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris–Gas Chromatography–Mass Spectrometry to interdisciplinary standards such as E620–11 Standard Practice for Reporting Opinions of Scientific or Technical Experts. Interestingly 19 of these standards or guides apply in the discipline of document examination.

The National Research Council’s report (2009), *Strengthening Forensic Science in the United States: A Path Forward*, concluded, “Often there are no standard protocols governing forensic practice in a given discipline, and, even when protocols are in place (e.g., scientific working groups (SWGs) standards) they are often vague and not enforced in any meaningful way.”

The first recommendation of the NAS report was that a National Institute of Forensic Science (NIFS) be

established. This body should then be tasked to work with the National Institute of Standards and Technology (NIST) to develop standards that should reflect best practices and serve as accreditation tools for laboratories and as guides for the education, training, and certification of professionals (recommendation 6). Furthermore, recommendation 7 included that NIFS should take into account established and recognized international standards, such as those published by ISO.

Although the NAS report acknowledges the work of SWG’s in developing guidelines across numerous discipline areas, they did not believe these guidelines had the rigor or standing of standards. On one hand, guidelines can meet the requirements of a standard, which can be voluntary in nature. On the other, they may fall short of a true standard as the SWG who develops the guideline may not be representative of all vested interests. A hallmark of standards committees is that they should include representatives of a variety of sectoral or stakeholder groups and that the final standard is a consensus document. It could be argued that SWG groups have a more controlled and invited membership and do not provide appropriate opportunity for broader sectoral input. Furthermore, a key element in the standards development process is public consultation. SWG and other industry-developed guidelines are “in-house” products and do not generally have opportunities for broader public comment and input.

Hence, the current situation in the global forensic industry is that there are a limited number of standards specific to forensic practice that are supplemented by industry-developed guidelines, but they lack the authority or standing of true standards (Brandi and Wilson-Wilde 2013).

Generally speaking, the forensic industry remains unregulated by governments unlike many other areas such as health (Robertson, 2011). Governments would appear to have chosen to rely on voluntary standards in the forensic sector, and there has been very limited public investment in developing forensic specific standards. The nature of voluntary standards means that someone has to *volunteer* to step forward and propose the development of a standard. Standards organizations rely on interest groups to propose new standards, and there is an increasing focus on standards being driven by the commitment of stakeholders at their financial cost.

The key messages for the forensic industry to develop standards are that the committee developing the standards needs to be inclusive, broadly based, ready to communicate widely and accept ideas and criticism from that broader group of interested parties, and be willing, where necessary, to contribute to funding the process (ISO 2013c; White House Office of Management and Budget 1998). In this environment it is simply common sense to only develop standards when there is no international standard and only where the sector identifies a clear need. However, in the forensic world, the sector is *not* simply forensic laboratories and the responsible committee needs to engage with a broader group of interested parties in developing standards, if these are to gain the confidence of all stakeholders in the criminal justice system.

## THE AUSTRALIAN CONTEXT

The forensic sector in Australia reflects the diverse governance and jurisdictional nature of Australia with a federal government, six state governments, and two self-governing territories. Major forensic providers are held mainly in the government sector with only limited private providers. At an organizational level, government providers include police, health, justice, and other government agencies. Service delivery models differ markedly between jurisdictions from fully integrated to service delivery splitting between a range of providers. There is no official regulatory body covering all forensic providers. However, at a senior management level there are two key groups that have worked closely for more than two decades to promote and develop forensic science in Australia. Established in 1986, the first of these groups is the Senior Managers of Australia and New Zealand Forensic Laboratories (SMANZFL). SMANZFL is second only to the American Society of Crime Laboratory Directors (ASCLD) in terms of longevity. The second group, established in 1992, is the Australian National Institute of Forensic Sciences (NIFS), now formally part of the Australia New Zealand Policing Advisory Agency (ANZPAA) (NIFS is now called ANZPAA NIFS).

These two organizations have much in common and have cooperated with other international groups such as the European Network of Forensic Science Institutes (ENFSI). SMANZFL differs in one important aspect from other forensic senior management groups in that it is inclusive of field and laboratory forensic science and

medical disciplines. ANZPAA NIFS was established with a mission to facilitate continuous improvement in the forensic sciences and to promote awareness of them in the wider community through strategic partnerships.

ANZPAA NIFS is funded, at the time of writing, through contributions from Australian Police services and the Commonwealth Attorney-General's department, at the federal level and represents Australian jurisdictions with New Zealand holding observer status. However, ANZPAA NIFS has always had a broader and inclusive role in supporting forensic science providers in all government agencies. ANZPAA NIFS relies on the advice and cooperation of the forensic science community, in particular forensic science providers and agencies. As a network of laboratory directors, SMANZFL provides the key interface between ANZPAA NIFS with both senior management of government laboratories and forensic subject matter experts. This is achieved through a shared funding model that includes standardization of training, methods and procedures, and research and development.

This has been a very effective partnership that has seen the development in the early 1990s of an accreditation framework working with the Australian accreditation agency, the National Association of Testing Authorities (NATA). The first laboratories accredited in Australia held a joint ASCLD-LAB/NATA accreditation.

The accreditation framework in Australia is mature, with almost all providers holding appropriate accreditation. NATA accredits against the ISO 17025 standard but also has separate supplementary forensic requirements (National Standards Advisory Committee 2013). SMANZFL have kept a watching brief on how formal standards might play a role in forensic providers demonstrating compliance against ISO 17025, but it was not until the early 2000s that SMANZFL decided to explore this formally. Once again SMANZFL worked with ANZPAA NIFS on this issue.

## THE DEVELOPMENT OF A FORENSIC STANDARDS FRAMEWORK

The rationale behind the decision to develop forensic science-specific standards in Australia began with Standards Australia (SA), the government nominated body responsible for developing Australian Standards. SA was becoming increasingly involved in issues that

would be better informed if they had significant forensic science input, such as work being undertaken by SA committees CH-023 General Methods of Chemical Analysis and CH-036 Analysis of Body Fluids. This work posed a significant risk that relevant standards would be developed and implemented (either in Australia or overseas) without an appropriate level of industry involvement. In addition, the USA (through NIST) had already written standards that had implications in the forensic science environment. The forensic science community also identified certain operational procedures that were not covered by ISO 17025 and where standardization was necessary and appropriate. ANZPAA NIFS could not set or regulate forensic science standards but could strongly influence standardization and adoption of standards through the ANZPAA NIFS stakeholder groups, and the courts could effectively provide the “regulation service.”

The ANZPAA NIFS also identified that compliance with a platform of relevant standards for law enforcement and forensic disciplines would ensure that methodologies were robust, repeatable, and validated, and that training across jurisdictions was consistent. A truly unified approach under such circumstances would only be possible if each jurisdiction was working in accordance with common standards. This could also minimize court challenges.

Hence, the journey to develop forensic specific standards was very much a shared journey involving SA, with ANZPAA NIFS making the formal approach to SA to develop such standards. The timing of this initial approach occurred over an approximate 21-month period from December 2006 until September 2008, when the first forensic standard proposal was submitted to SA. The Australian Federal Police (AFP) forensic group demonstrated significant support to embrace the formal development of standards by seconding a staff member to ANZPAA NIFS to develop options on how to proceed, including the identification of the first standard to develop.

This initial scoping period coincided with a major review of how SA engaged with industry and stakeholders to develop future standards. SA as a not-for-profit agency receives more requests to develop standards than it has the resources to support and had reached the stage where there would be unacceptable delays in developing new standards, and some proposals simply would not be able to be supported, if SA did not change the way it conducted

its business. A “national standardization strategy for Australia” consultation paper was developed by SA (National Association of Testing Authorities, Australia 2013) with four principles as follows:

- Standards will benefit the Australian community;
- Australia will maximize use of prevailing international standards;
- Standards development will be driven by commitment of stakeholders; and
- Australian standards will only be produced where appropriate.

Central in these principles in developing forensic standards was the increased focus on standards development being driven by stakeholder commitment, including direct financial contributions to the process, and *only* producing standards where appropriate.

Specifically in relation to the third principle, the consultation paper stated that:

- Sectorial groups will identify and justify their standards development needs;
- Sectorial groups will engage and support development of standards to meet their needs;
- Standards development processes will include access to an effective independent complaints and appeals process;
- Standards development processes will utilize technological improvements to facilitate engagement and input by broad communities of interest in development of standards, and;
- Relevant sectorial groups, government and non-government, will engage appropriately to enable an effective interface across the regulatory continuum where standards may add value.

As a general statement, aside from knowledge of ISO 17025 and a small number of other relevant standards, few individuals, far less forensic organizations, had any special knowledge of the committee process to develop a standard. One SMANZFL member had chaired a SA committee (HE-006) that developed AS/NZ 54757:2002 Handling and destruction of drugs.

A decision was made to firstly develop a shorter discipline-specific standard partly as a learning process for our industry. The area identified was ignitable liquid in fire debris. This was chosen for three reasons.

Firstly, although there are ASTM standards in this area (E1386–10, E1388–12, E1412–12, E1413–12, E1618–11, and E2154), these were not directly transferrable to Australia due to differences in the classification of ignitable liquids between the United States and Australia. Furthermore, a single holistic standard for ignitable liquids was desirable; third, the SMANZFL discipline advisory group or Specialist Advisory Group (SAG) had identified the need for formal standards in this area. SA follows generally the same steps as ISO for the development of new standards, which are:

1. Proposal stage
2. Preparatory or working draft stage
3. Committee draft stage
4. Public comment or enquiry stage
5. Approval stage (draft standard)
6. Publication stage

The proposal was approved by SA in November 2008 following a formal proposal by ANZPAA NIFS. The work commenced on a part-time basis and was a significant learning exercise for the standard development team. Once the development of the standard had progressed, SA submitted a proposal in September 2009 to their internal governance group, the Project Management Group, to establish a forensic-based committee to oversee and guide the development of forensics-based standards. This committee was formally established in March 2010 and called CH-041, Forensic Analysis. The Committee comprised representatives from 12 organizations including ANZPAA NIFS, ANZFSS, NATA, five police agencies (in the main representing forensic groups), two universities (one law program and one forensic program), a forensic medicine agency, and a representative of a consumer action group. At the first meeting of the committee a chair was elected for CH-041. The key learning experiences from developing (AS 5239-2011) helped inform the committee when it later moved on to develop AS 5388 on forensic analysis.

Members of the relevant SMANZFL SAG on chemical criminalistics were approached to create a working group. Drawing on the existing ASTM standards, and in house protocols and methods, a first draft was developed by the working group, assisted by the seconded AFP forensic scientist working out of ANZPAA NIFS. The draft standard was then forwarded to the CH-041

committee for further development and progression. Each member of the committee brought their own specific knowledge and skills but, by its very nature, this higher-level group was not a group of experts in any one area of forensic work. Hence, considerable reliance was placed on the advice of the SAG, experts within committee member organizations, and by engaging at senior manager level with SMANZFL, and through it, with quality managers. It was considered essential that these be aligned with the NATA supplementary requirements for reasons that will be further considered later in this paper.

After more than 12 months of several meetings of the committee and significant ongoing consultation and communication, the standard reached the public consultation phase; however, there were still some major issues, even with agencies represented in the committee. Despite all of the consultation and communication strategies, some still felt that their concerns had not been properly considered.

Although standards are consensus documents and do not require the unanimous agreement of committee members, there was a strong desire for consensus to mean approval by all committee members. In a standards environment, the term *consensus* is a calculated figure determined by a formulae based on the percentage of committee members who vote and the percentage of votes in the affirmative. In the final stages of the standard development process it took one-to-one discussions with a small number of committee members and experts within their organizations, point by point, to resolve remaining issues. The sticking points were over wordings that were eventually resolved through the smaller meeting, the results of which were fed back to the main committee. Agreement was reached, and AS 5239–2011 was approved in November 2011 by SA and published 5 December 2011.

The process of developing this standard was critical to the following success in the development of AS 5388 on forensic analysis. In brief, the experience with AS 5239 demonstrated the need to engage with technical specialists as early as possible, work hard to ensure buy in and active involvement from senior management, consult broadly, and communicate, communicate, and communicate again! Clichéd as it may be, communication only works if all parties are actually listening to each other.

# THE DEVELOPMENT OF AUSTRALIAN STANDARD 5388: FORENSIC ANALYSIS

As a result of the strategies adopted by SA following their earlier consultation paper and new pathways to propose and develop new standards, ANZPAA NIFS brought forward proposals to SA to develop a standard for forensic analysis in May 2010. SA supported their internal standards development processes, and the forensic community met their costs associated with developing content. Project funding came from a grant from the Federal Commonwealth Attorney-General's Proceeds of Confiscated Assets (POCA funding). This supported the employment of two staff members and numerous meeting costs to develop the standard. Standard development fees were not required in this instance as SA agreed to progress the standards through the "Committee Driven" pathway that requires all project management and associated costs to be borne by an external agency (in this case ANZPAA NIFS). SA fees are therefore waived. Without the significant POCA funding, the project would not have been possible.

The rationale for this standard was to develop a core non-discipline specific standard for the whole forensic process, from crime scene to reporting (Wilson-Wilde et al. 2011). Figure 1 illustrates the relationship between the forensic processes and the core forensic standards and discipline specific standards. By analogy this standard can be linked to a human spine—it needs to be rigid enough to support the individual but sufficiently flexible to allow for normal movement. It was then envisaged that discipline-specific standards would connect to the spine like ribs.

The development of a holistic core standard was intended to reduce the need for each discipline-specific standard to repeat elements covered in the core, making discipline specific standards concise and easier to develop. The Core Standard reflects the central value chain of the forensic process, and is common across all disciplines.

The standard was developed in four parts as follows:

- Part 1: Recognition, recording, recovery, transport and storage of material
- Part 2: Analysis and examination of material
- Part 3: Interpretation
- Part 4: Reporting

In addition to the core CH-041 committee and its 12 organizations (now increased to 18 organizations) broader representation reflecting specific interests relevant to each part was solicited. This appears to be the first time that anyone has attempted to produce core standards. Each part was drafted by the project team, who drew on existing protocols and methods used by jurisdictions and on other standards where these existed.

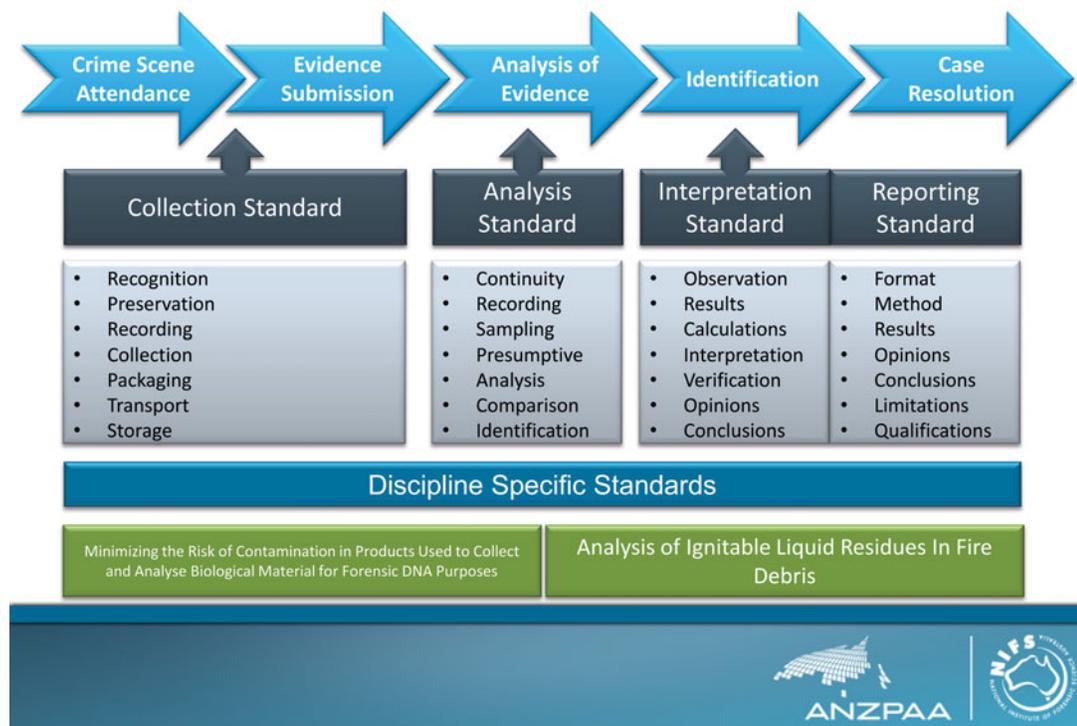
Learning from the experiences in developing AS 5239–2011, early advice and input was sought from relevant specialist advisory groups and other experts. The committee then revised each draft, amendments considered, and this process repeated as needed until an advanced draft was approved for the public consultation phase. Even with this level of consultation, strong feedback was received that insufficient attention was placed on engaging more broadly across the broader relevant forensic community in the drafting process including external academics, statisticians, and the legal profession.

This was a rigorous and time-consuming process. In this way all four parts were developed over approximately 24 months. This short timeframe was required to meet SA deadlines and requirements and also the POCA funding availability. This often meant very short timeframes to review drafts and provide input. Realistic requirements for review opportunities and associated timeframes need to be communicated early to stakeholders at all levels of the consultation process.

Despite our experiences with AS 5239–2011, we still experienced issues with consultation and communication and, with some parts, the public consultation phase. As these standards break new ground this was not entirely unexpected. It should also be noted that most industry standards evolve over many years and represent an evolutionary process from guidelines to standards.

Most members of the committees and groups consulted had little to no direct experience in developing standards and sometimes struggled to understand the formal process. This observation also applied to the public comment phase. As an example, the rules are quite clear in that anyone making a comment must offer an alternative to the section, clause, or sentence being challenged. It is not sufficient to simply say that they disagree with an entire approach, document, or some specific aspect. Some individuals who commented on the draft standards missed the opportunity to influence its further development with alternatives.

# Forensic Science Standards



**FIGURE 1** Relationship between the forensic processes and the forensic standards framework.

Furthermore, some commentators failed to understand the purpose of standards, thinking they were supposed to meet minimum levels, best practice, or even aspirational levels of practice. The reality is that standards are aimed at acceptable professional practice, otherwise they would have no chance of being consensus documents. The level of acceptable professional practice is determined by the standards development committee, taking into account the requirements of industry and stakeholders, balanced against what is achievable in the current climate. The concept of where a standard should be aimed at was one of the hardest aspects to communicate to stakeholders, and it is recommended that this should be communicated early and often through the entire process of developing a standard.

It is interesting to note that the issues remaining in the final phase were not drawn out by the committee process or the public comment process. There appeared to be reluctance by committee members, or individuals within the organization that the committee member represents, to put forward issues or specific changes required. It is unclear why this is, but could be due to any or a combination of the following:

- Lack of time to put forward comments when not at the critical/final phase;
- Trying to save time/work by putting in more generic comments (that are often later ignored by the committee process);
- An unwillingness to commit to a limited number of points that would then tie the committee member into voting into the affirmative; and
- A desire to be specifically heard.

The process above resolved most issues but not all. At the final ballot some committee members still had fundamental objections to some aspect of the standard. This was usually around a philosophical issue to specify the gold standard as the benchmark to reach. This was an insurmountable issue and members chose to express this by either abstaining from the voting process or voting in the negative. Since consensus is a mathematical consideration in standards development, this did not affect the standards ultimately progressing to publication.

Although some observers will point to these standards as being very generic and non-aspirational, it was still a considerable journey for committee members

to embrace new approaches and, for some, enhanced requirements, given that they knew that their organizations would need to review their existing practice and processes to ensure compliance. At least in Australia it was accepted by all that the implication in developing these standards is that they would be used.

However, outside of the authority of the committee it is likely that these standards will at least significantly reduce the existing NATA forensic supplementary requirements. As a general observation, in the evolution and development of each part of this standard, each started off being a much longer document than the final standard. In each part material would first move from being considered normative (an integral part of the standard) to being informative (for information and guidance only) and for some material to be dropped from the standard altogether.

All four parts of AS 5388 have been published and all agencies in Australia can now be assessed for accreditation against these standards. The timing of accreditation will differ for each agency depending upon the timing of current accreditation program cycles. The next challenge will be to develop discipline-specific standards. Until this takes place, the full potential of AS 5388 will not be realized. The development of discipline-specific standards will be a major challenge making demands on specialists and discipline experts and will have significant cost implications. Clearly, these will have to be developed over time. One of the major issues for forensic managers in the process to develop AS 5388 was the need to meet quite aggressive timelines. In the early stages the preliminary standard rapidly evolved into something more closely resembling the final standard. Hence, it is likely that the future approach in Australia will be to first develop and mature this preliminary document as a guideline rather than a formal standard. The guideline would follow the format and approach of a true standard but could be “mood tested” before a formal approach is made to SA to develop it into a full standard.

## FINAL COMMENTS AND CONCLUSIONS

The purpose of this paper was to discuss the Australian experience in developing forensic specific standards. This started with a discipline-specific standard as a learning experience followed by the development of a core forensic standard based on four parts and covering the end-to-end process from crime scene to reporting.

This seems to be a novel approach. It is the first time a holistic non-discipline forensic standard has been developed. However, we understand we are certainly not alone in recognizing the need to develop forensic standards, noting the recent joint announcement of the U. S. Department of Justice and the U. S. Department of Commerce’s move to establish a national commission on forensic science with a goal to strengthen the forensic science system (National Institute of Standards and Technology, 2013).

While there is some Australian-specific content, we see no reason why this standard could not be adopted by others with or without modifications to reflect local practice and requirements. Given the effort and cost to develop standards, international standards organizations promote the view that standards should only be produced when no suitable standard is available, accepting that there will always be the need for some standards to meet jurisdictional or country-specific conditions.

The complexity in having a country-produced standard accepted as an ISO standard should not be underestimated, but where the desire exists it is possible. As well as developing AS 5388 the SA forensic committee, CH-041, developed AS 5483–2012 Minimizing the risk of contamination in products used to collect and analyze biological material for forensic DNA purposes. This standard has been accepted by ISO as the starting point for the development of an ISO standard. This is not the first example of an Australian standard being used as the first draft to develop an international standard, e.g., Risk Management, ISO 31000:2009 is based on AS/N2S 4360–2004.

Finally, as we have previously stated, it is important to reiterate that standards by their very nature are not aspirational, or even best practice. They are documents at a “window in time” attempting to capture, evolve, and improve current practice and to draw important lines in the sand as to what is no longer acceptable practice. As SA state, “standards are living documents that reflect progress in science, technology, and systems” (Standards Australia, 2013). Amendments may be issued at any time and standards are reviewed periodically, at least every five years, and potentially new editions published.

Our hope is that these standards will prove to have real practical value for our community, and that they will encourage others to debate the issues, whether or not they ultimately lead to the development of an ISO standard.

## STANDARDS CITED IN THIS PAPER

- AS/N2S 4757 – 2002. Handling and destruction of drugs.
- AS ISO/IEC 17025 – 2005. General requirements for the competence of testing and calibration laboratories.
- AS/N2S ISO 31000 – 2009. Risk management-principles and guidelines.
- AS 5239 – 2011\*. Examination of ignitable liquids in fire debris.
- AS 5388.1 – 2012\*. Forensic Analysis, Part 1: Recognition, recording, recovery, transport and storage of material.
- AS 5388.2 – 2012\*. Forensic Analysis, Part 2: Analysis and examination of material.
- AS 5388.3 – 2012\*. Forensic Analysis, Part 3: Interpretation.
- AS 5388.4 – 2012\*. Forensic Analysis, Part 4: Reporting.
- AS 5483 – 2012\*. Minimizing the risk of contamination in products used to collect and analyze biological material for forensic DNA purposes.

## ACKNOWLEDGMENTS

These standards could not have been developed without the input of many individuals and organizations. Too numerous to name we acknowledge that as authors of this paper we are merely reporting on behalf of our unnamed colleagues. Suffice to say that every forensic organization in Australia contributed to these standards. In addition, our colleagues from New Zealand and the broader forensic community also actively participated.

The development of these standards would not have been possible without the direct support from the Australian Federal Police, funding support from the Commonwealth Attorney-General's Department, and the support and direct management and coordination from ANZPAA NIFS.

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